an amphidiploid species stemming from the cross *A. viscida* × *A. patula*. If there is predictive value in a comprehensive cytotaxonomic, morphological and ecological survey of the genus, it seems likely that the species *A. peninsularis* may have had an analogous ancestry, involving *A. glauca* and *A. patula*.

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LEGUMES OF THE U.S. VI. CALLIANDRA, PITHECELLOBIUM, PROSOPIS

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Herein, I complete a generic summary of the mimosoid legumes of the United States, except for cultivated *Acacia*. The objectives and format of these publications are briefly delineated in Isely (1969). The treatments include generic descriptions, keys to species, range and habitat characterization, and taxonomic and nomenclatural commentary.

Accessions of material of the subject genera from the following herbaria were studied in preparation of this paper: NY, ISC, TEX, NMC, LAF, ARIZ, FSU, USF, POM, and RSA. Selected materials and (or) types have been studied by courtesy of: GH, MO, LL, US, LA, and PH. My debt to the institutions and curators is obvious. And my thanks to several botanical friends (Rupert Barneby, Marshall Johnston, R. W. Pohl, Jean Wooten) who reviewed this manuscript or portions of it.

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Calliandra Benth.

Low perennial herbs or shrubs; or (not in U.S.) trees. Leaves twice compound without foliar glands. Pinnae 1—several pairs. Stipules small but usually persistent and evident. Peduncles axillary, clustered or racemose. Flowers capitate, often relatively few in each head, white, pink or red. Calyx campanulate. Corolla tube funnelform, equalling or exceeding lobes. Stamens numerous, fused below, much exserted. Legume compressed, cuneate-oblong, not septate, dehiscent; margins thickened; valves membranous to subwoody, separating from apex and curling individually.

A primarily tropical American genus of possibly 100 or more species (estimates vary widely, e.g.: Britton and Rose, 1928; Hutchinson, 1964; Woodson and Schery, 1950). Ours southern Texas to California; several tropical species slightly introduced.

Chromosome base number x = 8 determined from two species (Atchison 1949, 1951).

In the United States, *Calliandra* is easily defined and recognized on the basis of its distinctive pods (both as to shape and mode of dehiscence), and few-flowered heads. Our native representatives are primarily of two complexes, one woody and the other herbaceous, that center about *C. eriophylla* and *C. humilis* respectively. Both groups require biosystematic investigation throughout their entire ranges.

Perhaps ten species of tropical *Calliandra* have been introduced into the United States in specialized plantings. I have admitted two as constituents of our cultivated flora.

CALLIANDRA Benth., Hook. Jour. Bot. 2:138. 1840! nom. cons. Type species: *Mimosa houstoni* L'Heritier, nom. illeg. [*Calliandra houstoni* (L'Heritier) Benth., nom. illeg.] *Calliandra inermis* (L.) Druce.

ANNESLIA Salisb. Parad. Lond. Pl. 64. 1907! nom. rejinciendum.

Further synonyms are tabulated by Hutchinson (1964); these represent names either based on tropical species that I have not studied or are spelling variants of *Anneslia*.

Key to species

Flower heads 4–6 cm in diameter; cultivated ornamentals of urban California and possibly southern Florida and Texas.

Pinnae 1 pair; leaflets ca 5 pairs, to 6 cm long; heads pinkish. *C. inaequilatera*

Pinnae ca 4 pairs; leaflets 15–20 pairs, less than 1 cm in length; heads red-scarlet. . . . . *C. tweedii*

Flower heads much smaller than above; native species, Texas to Arizona.

Flowers 2 per head; corolla 4–5 mm high; pinnae 1–3 pairs; local, southern Texas . . . . . *C. biflora*

Flowers 4–10 per head; if from southern Texas, pinnae 1 pair and corolla 3.0–3.5 mm.

Leaflets not imbricate, 4–6(7) pairs; pubescence when present of tiny hairs 0.1–0.2 mm long; corolla ca 2.5 mm in length; local woody species of Pima Co., Arizona. *C. schottii*

Plants not with above combination of characters; widely distributed species; if from Pima Co., Arizona, herbaceous with corolla 4–5 mm long, or woody with 7–10 pairs imbricate leaflets.

Plants herbaceous; petioles of well developed leaves 1.5–3(4) cm long; pinnae 1–6 pairs . *C. humilis*

Plants woody; petioles less than 1 cm long; pinnae 1–3 pairs.

Pinnae 1 pair; Texas . . . . . *C. conferta*

Pinnae 2–3 pairs (some leaves may have 1 pair); Arizona and slightly into New Mexico. *C. eriophylla*

Calliandra biflora Tharp

Southern Texas. Adjacent Mexico. Local, sandy or loam soil. May-July.

Calliandra biflora lies at the periphery of the range of *C. eriophylla* var. *conferta*. But the differences are so numerous, I would hesitate to postulate a close relationship.

The Texas stations (DeWitt and Goliad Co's. for *C. biflora* are local and moderately disjunct from the Tamaulipas collection sites. It is to be sought in the intervening portion of southern Texas.

U.S. material of *C. biflora* appears to be herbaceous-suffrutescent, the tops dying back to the ground each year. But Mexican specimens are low shrubs with perennial stems.

Calliandra BIFLORA Tharp, Rhodora 56:132. 1954! Type TEX! Isotype SMU! *Reidel & Tharp 44419.*

Calliandra conferta Benth.

Southern to western Texas. Adjacent Mexico. Calcareous, gravelly hills, canyon slopes, desert scrub. 500–4000 ft. April-July.

Relationships of *Calliandra conferta* to *C. eriophylla* are discussed under the latter species.

Turner (1959) has noted that western Texas forms differ from those in central and southern Texas in the possession of "much longer peduncles." I have plotted on a distributional map two forms: (1) peduncles 1 cm or more, (2) peduncles less than 1 cm. I agree with Turner. Perhaps this feature marks a geographic variety.

Calliandra CONFERTA Benth. in Gray, Pl. Wright 1:63. 1852! Isosyntypes U.S.! *Wright 166 & 167,* NY! *Wright 166.*

Calliandra eriophylla Benth.

Southern California to western New Mexico. Adjacent Mexico. Rocky desert slopes and plains, washes, canyons, cliffs, usually with *Franseria, Carnegia, Cercidium, Prosopis.* Common. 400–4500 ft. (Jan.) March-May, Sept.-Nov.

Calliandra eriophylla presents no major problems in the United States. The closest relative is *C. conferta* Benth. The two species are easily distinguished morphologically and are disjunct geographically. However, interpretation of some Mexican material is uncertain, and it may be that *C. eriophylla* and *conferta* constitute geographical phases of one species.

I am treating an equivocal, rare form of western Texas and possibly adjacent New Mexico as a variety of *C. eriophylla* as follows:

Pods 2.5–5.0 (7.0) cm long, oblanceolate; petioles 3–5 mm long; flowers (4)5–10(12); pinnae (1)2–4 pairs . . . . var. *eriophylla*

Pods 7–9 cm long, narrowly oblong; petioles 5–7 mm long; flowers 2–5; pinnae mostly 2 pairs . . . . . var. *chamaedrys*

Var. *chamaedrys* Isely

In 1967 I encountered three sheets at NY *(Wright 1367; Wright 1043; Parry Mexican Boundary Survey 317a)* from the 1840's and '50's that represented *C. chamaedrys* sensu Gray 1853 (loc. cit.; non *C. chamaedrys* Engelm. 1849). They seemed probably referable to *C. eriophylla* but differed strikingly in the narrowly oblong pods which tapered only proximally. They came from an area approximately intermediate between the apparent ranges of *C. eriophylla* and *C. conferta.* I looked through ample Mexican material of the *C. eriophylla* complex (NY) but found nothing with pods like the sheets at hand. Lacking any modern collections I deferred taxonomic consideration. Two years later, I encountered a single, recent collection possessing the distinctive pods and other features of var. *chamaedrys.* Information for a decision is all too limited, but this taxon seems too distinctive to ignore. Hopefully, future collectors will encounter it in West Texas, and adjacent New Mexico, and Mexico.

Calliandra eriophylla var. **chamaedrys** Isely, var. nov.

Fruticulus humilis. Petioli 5–8 mm longi; pinnae (1)2-jugae. Flores 2–5. Legumina 7–9 cm longa, 5 mm usque lata, anguste oblonga nunc basin versus sensim attenuata. Holotype: SMU! *Turner 3642.* 15 miles north of Uvalde, Uvalde Co., Texas. June 26, 1954.

Calliandra chamaedrys sensu Gray, Pl. Wright 2: 52. 1853! non *C. chamaedrys* Engelm. 1849.

Gray (loc. cit.), citing both the Wright gatherings that I have seen, recognized this taxon over a century ago and I have taken up the name as he used it. Since, however, his name probably represented a misapplication of the Englemann *chamaedrys,* my epithet is not based on his.

Var. *eriophylla*

Distribution and habitat as species.

Exomorphic variance within this variety relates to number of pinnae, length of pod, and size and showiness of flower heads (length and color of stamen filaments). A single plant may possess leaves with 1–4 pairs pinnae. The leaves of most California material are limited to 1–2 pairs pinnae and I believe there is some correlation with small size of flower heads. Thus, in these attributes, these forms exhibit a reverse cline towards *Calliandra conferta.* Occasional plants possess pods approaching those of var. *chamaedrys* in length yet lack other features of that variety.

Calliandra ERIOPHYLLA Benth., Lond. J. Bot. 3: 105. 1844 !*Feuilleea eriophylla* (Benth.) Ktze., Rev. Gen. 1: 187. 1891! *Anneslia eriophylla* (Benth.) Britt., Trans. N.Y. Acad. Sci. 14: 32. 1895!

I follow the application of the binomial *Calliandra eriophylla* that has been consistent since Bentham's time. However, I have not seen the type.

My identification of *Calliandra chamaedrys* Engelm. is primarily from the description. Engelmann based his name upon a Gregg and a Wislizenus specimen. There is a Gregg specimen (probably typical *C. eriophylla* but lacking pods) designated *C. chamaedrys* Engelm. in GH and stamped isotype. But the locality designation does not match that cited by Engelmann.

Calliandra humilis Benth.

Western Texas to northern Arizona. Adjacent Mexico. See varietal treatment.

Conspicuous variation in the *Calliandra humilis* complex relates to three kinds of features:

(1) Pinnae and leaflet number, and leaflet size. One suspects that variance in these features is correlatively controlled by one gene system. The forms with small leaflets have numerous leaflets and pinnae and *vice versa.* All extremes occur in Arizona, but Texas lacks the phenotypes with few, large leaflets.

(2) Flower heads pedunculate or sessile. There is little intermediacy between these conditions except that some specimens (mostly Arizona) have both sessile and stalked heads. Variance in this feature appears largely independent of that pertaining to leaves, but in western Texas, there is some relationship between sessile heads and reduced number of

pinnae. Both sessile and pedunculate heads occur in most parts of the range.

(3) Plants pubescent or glabrate. Plants with large leaflets are glabrate. Those with small leaflets may be either glabrate or pubescent, a few are conspicuously villous.

It is possible to roughly sort material into four groups by leaf and peduncle diversity. Each variant has been the recipient of epithets (in binomial or trinomial form) as follows:

Key to variants

Pinnae 3–6(8) pairs; leaflets 6–14 pairs, 3–5 mm long

Heads pedunculate . Variant 1. *Calliandra herbacea Engelm.; C. humilis* Benth. non *Acacia humilis* Schlecht.

Heads sessile . . . Variant 2. Primarily *C. humilis* auct.; in part *Calliandra herbacea* auct.

Pinnae 1–2 (3) pairs; leaflets 5–6 (8) pairs, (4) 5–10 (12) mm long

Heads pedunculate . Variant 3. *C. reticulata* Gray; *C. reticulata* and *C. humilis* auct.

Heads subsessile . . Variant 4. *Acacia humilis* Schlecht.; *C. reticulata* and *C. humilis* auct.

Recent interpretations of this complex (Britton & Rose, 1928; Benson, 1943; Turner, 1959; and Kearney *et al.,* 1960) assign names (as species or varieties) to various combinations of these variants. My postulate is to recognize two overlapping geographic varieties: variants 1 and 2 are var. *humilis;* variants 3 and 4 are var. *reticulata.* In making this decision, which parallels that of Benson (1943), I am giving leaf characters more weight than peduncle variance because leaf features exhibit geographic orientation and broader correlation with pubescence.

Key to varieties

Pinnae 3–6(8) pairs; leaflets 6–14(20) pairs, 3–5 mm long, pubescent in Arizona portion of range; western Texas to Arizona. var *humilis*

Pinnae 1–2(3) pairs; leaflets 5–6(8) pairs, (4)5–10(12) mm long, glabrate; Arizona and adjacent New Mexico . . var. *reticulata*

Var. *humilis*

Western Texas to northern Arizona. Texas: open rocky, igneous and limestone soils; Arizona: grassy slopes, oak woodland, pinyon-juniper or yellow pine. 3000–8000 ft June-July (Aug.)

This variety seems to occur essentially throughout the U.S. range of the complex and is the only variety in Texas. There is a geographical break between the Texas and the Arizona forms. But there seems to be no morphological differentiation except that both glabrate and pubescent forms occur in Texas.

The Arizona populations of var. *humilis* include both variants 1 and 2 (with and without peduncle) with a preponderance of the latter. Mapped, they seem to display no distributional differences; correlation with other features is abortive. Benson (1943) indicates that his typical var. *humilis* (Arizona) usually occurs at lower elevations, 3000–5000(7000) ft., and that var. *reticulata* is of pinyon-juniper or yellow pine at higher elevations. My field observations suggest that the two forms are rarely geographically or ecologically sympatric, but I have not confirmed a distinct altitudinal zonation.

In western Texas, where populations are exclusively of var. *humilis* as I have delimited it, variants 1 and 2 are treated as *C. herbacea* and *C. humilis* by Turner (1959). Here, pubescence and pinnae number correlate with peduncle length to a reasonable degree, and two forms can be characterized with reasonable clarity. But such differentiation doesn't work in Arizona.

Calliandra HUMILIS Benth., Lond. J. Bot. 5: 103. 1846! Fragment of type GH! Coulter "Azcatecas sp. n." non *Acacia humilis* Schlecht. 1838!

C. HERBACEA Engelm. in Gray, Mem. Amer. Acad. Arts. Sci. series II, 4: 39. 1849! Type GH! Fendler 180. *Anneslia herbacea* (Eng.) Britt. & Rose, N. Am. Fl. 23: 57. 1928!

Calliandra humilis Benth. is the binomial the species must take. *Acacia humilis* Schlecht. is the oldest name referable to this species (var. *reticulata* below), but its transfer to *Calliandra* is blocked by the Bentham name. Benthan was not making a combination; he cites a different type than did Schlechtendal, and does not cite him.

Both *Calliandra humilis* Benth. and *C. herbacea* Engelm. are easily referable, both as to type specimen and description, to var. *humilis* as I have circumscribed it. Reference of these names to the variants tabulated above is less than consistent. Some authors have treated *C. humilis* as a taxon with sessile heads but those of the type are distinctly pedunculate. *Calliandra herbacea* Engelm. has "peduncles one inch" but the Fendler sheet cited has both sessile and pedunculate heads on the same plant. Gray earlier compounded confusion about application of these names through distribution of *Wright 1044* which is an exsiccatae melange of several gatherings that include both forms.

Var. *reticulata* (Gray) Benson

Southwestern New Mexico to central Arizona. Grassland to pine forests and open gravelly slopes near mountain peaks, wooded ravines, swales. 4000–8000 ft. (May) July-August.

This variety apparently does not go as far north in Arizona as var. *humilis* ano material from Coconino and Yavapai Co's. and is said (Benson, 1943) to occur at higher altitudes. As to specimens, vars. *hu-*

milis and *reticulata* intergrade, and determination of some material is arbitrary. However, in the field I have not seen the two in contiguous areas, and their identity has seemed unequivocal.

Calliandra humilis var. *reticulata* (Gray) Benson, Amer. J. Bot. 30: 630. 1943! *C. RETICULATA* Gray, Pl. Wright. 2: 53. 1853! Type GH!, isotype US! *Wright 1045. Anneslia reticulata* (Gray) Britt., Trans. N.Y. Acad. Sci. 14: 32. 1895! *Feuilleea reticulata* (Gray) Ktze., Rev. Gen. 1: 189. 1891!

Acacia HUMILIS Schlecht., Linnaea 12: 567. 1838! Presumed type (photo) NY! *Ehrenberg 563,* Propre Regla., non *C. humilis* Benth. 1842! *Anneslia humilis* (Schlecht.) Britt. & Rose, N. Am. Fl. 23: 57. 1928! *Feuilleea humilis* (Schlecht.) Ktze., Rev. Gen. 1: 188. 1891!

Calliandra inaequilatera Rusby

Urban southern California. Cultivated ornamental. Native of South America. Nov.-April.

This species is not uncommon in the Los Angeles area; it is treated by Enari (1962) and enumerated by Mathias and McClintock (1963). It is related to *C. guildingii* and *C. haematocephala* Hassk., and is probably conspecific with the latter. Recent annotations by Elias and Nevling at NY, noted as this paper goes to press, mark limited material (including the type) of *C. inaequilatera* as *C. haematocephala* Hassk. I maintain use of the traditional name for this species in California pending publication by the above-mentioned authors. (See note page 298.—Ed.)

Calliandra INAEQUILATERA Rusby, Mem. Torr. Bot. Club 6: 28. 1896! Holotype NY! *Bang 1568.*

Rusby's specimen (Bolivian material) and description are congruent, and seem to be of the species cultivated in the United States.

Calliandra schottii Wats.

Southern Arizona (Pima Co.) and adjacent Mexico. Rocky slopes, canyons, usually in pinyon belt. 3000–4500 ft. Aug.-Sept.

U.S. collections of this species are nearly all from the Santa Catalina and Baboquivari Mts.

Calliandra SCHOTTII Torr. ex Wats., Proc. Amer. Acad. Arts Sci. 20: 364. 1885! Lectotype GH! *Schott.,* Arroyo de los Somotos, Sierra Verde, Sonora. Aug. 20, 1855. *C. portoricensis* Benth. var. Torr., Emory Rep. 2: 61. 1859! Based on Schott. loc. cit. *Anneslia schottii* (Wats.) Britt. & Rose, N. Am. Fl. 23: 67. 1928!

Watson (loc. cit.) cites a Pringle gathering and refers to *C. portoricensis* var. Torr. I am basing *C. schottii* on Torrey's unnamed variety, and designating Torrey's cited specimen as lectotype.

Calliandra tweedii Benth.

Southern urban California, probably also Florida and Texas. Native of Brazil. Cultivated ornamental. Dec.-May. Flame bush.

The forms in the United States which I have seen have about 4 pairs of pinnae. Var. *sancti-pauli* has to 8 pairs pinnae; apparently it has not been introduced in the U.S.

This species is treated by Bailey (1949), Doty and Johnson (1954), Enari (1962), and Mathias and McClintock (1963). I have seen specimens primarily from the Los Angeles area.

Calliandra guildingii Hort. is *C. tweedii*—fide California specimens as well as Mattoon (1958) and Mathias and McClintock (1963). *C. guildingii* Benth. is a species with few, large leaflets (as *C. inaequilatera*). I have not seen *C. guildingii* in the United States. Material passing under this name has been commercially available in Florida and southern Texas as well as California.

Calliandra TWEEDII Benth., Hook. Jour. Bot. 2: 140. 1840! Photo of type (Kew) NY! *Tweedie 78,* Rio Jacury, Brazil. *Anneslia tweedii* (Benth.) Lindm., Bih. Svensk. Vet. Akad. Handl. 24(7):51. 1898!

Another photograph (NY!) purports to be of the type of *C. tweedii* Benth. It is *Sello 1178* Brazil from Herb. Reg. Berolinense, the specimen in the Berlin Herbarium. Since Bentham cites "Mountains of Rio Jaqury. Tweedie." I accept the Tweedie specimen.

Rejected Species

Calliandra anomola (Kunth.) Macbride. California. Novelty in cultivation, Santa Barbara. Determination of subject sheets (LA) is tentative.

Calliandra costaricensis (Britt. & Rose) Standl. Although enumerated by Mathias and McClintock (1963), there are no collections of this species at LA.

Calliandra guildingii Benth. Mattoon (1958) states that this South American species is commercially available from six sources in the United States (Florida, Texas, and California). Doty and Johnson (1954) and Mathias and McClintock (1963) assert that *C. guildingii* of horticulture is *C. tweedii.* Confusion between these two species might seem improbable—the foliage is utterly different—but both have in common the large, brilliantly red flower heads. I have not encountered *C. guildingii* in the United States.

Calliandra haematocephala Hassk. This species is enumerated by Mathias and McClintock (1963). Possibly U. S. material treated as *C. inaequilatera* Rusby (which see) should be referred to *C. haematocephala.*

Calliandra houstoniana (Mill.) Standl. A sheet from the Los Angeles area (LA) is of this species. It is not enumerated by Enari (1962) or Mathias and McClintock (1963).

Calliandra parvifolia (Hook. & Arn.) Speg. Collection from Winter Park, Florida said to have been obtained from a nursery (US; determined by Velva Rudd).

Calliandra portoricensis (Jacq.) Benth. California. Novelty in cultivation, Santa Barbara and Los Angeles (LA). Not tabulated by Mathias and McClintock (1963).

Calliandra selloi (Spreng.) Macb. Cultivated. Winter Park, Florida (US; determined by Velva Rudd).

Calliandra schultzei Harms. I have twice collected, in Florida, material which I took for *C. surinamensis:* in a commercial nursery at Bradenton and on the grounds of the Florida Subtropical Experiment Station at Homestead. Tentative association with *C. schultzei* was made by Dr. Howard Irwin who kindly examined my specimens.

Pithecellobium Mart.

Shrubs or trees. Stipules often spiny. Leaves (ours) twice-pinnate, often with but one pair pinnae and leaflets (thus four leaflets); with a stalked or sessile gland on the rachis between the lower or all pinnae. Leaflets mostly asymmetric, usually relatively large. Inflorescences of heads or infrequently spikes, these axillary or supra-axillary, or racemed or panicled. Flowers usually white. Stamens numerous, the filaments basally fused into a tube. Legume various, dehiscent or indehiscent, fleshy, woody or membranous, often circinately coiled and dehiscent. Seeds frequently with an aril.

A heterogeneous assemblage of species, largely of the American tropics or (if one interprets the genus more broadly) bihemispheric; 100–500 species (?).

Basic chromosome number x = 13; determinations on about eight species.

Concurrence concerning the generic limits of *Pithecellobium* has been limited. *Pithecellobium* in the broad sense, sensu Bentham (1875), was fragmented by Britton and Rose (1928). Woodson and Schery (1950) and Standley and Steyermark (1946) reverted to the Bentham concept at least as far as New World species were concerned. More recently, the delimitation of *Pithecellobium* is considered by Mohlenbrock (1963a, 1963b), Kostermans (1952), and Hutchinson (1964). Interpretations range from that of Kostermans who distributes Old World *Pithecellobium* among some nine genera (mostly new) to the conservative viewpoint of Hutchinson who segregates only *Samenea* Merrill from *Pithecellobium sensu lato*.

United States *Pithecellobium* falls into three groups as defined by fruit characters: (1) pods dehiscent, circinate (e.g., *P. unguis-cati*), (2) pods woody, slowly dehiscent, septate *(P. flexicaule)*, and (3) pods compressed, membranous, dehiscent *(P. pallens)*. I suspect that the merit of these groups as genera is as great as that of *Enterolobium* which traditionally has been defined by its distinctive fruits. Thus my viewpoin possibly resembles that of Mohlenbrock, loc. cit., who considers American *Pithecellobium* to represent several genera. But proposals for generic reorganization based on knowledge of only a small proportion of the total species exhibit a high level of abortion. Therefore, I presently abstain and use the name *Pithecellobium* in the traditional, convenient, albeit probably artificial, sense.

PITHECELLOBIUM Mart., Flora 20(2) (Beibl. 8): 114. 1837! (as *Pithecollobium*) nom. cons. Type species: *Mimosa unquis-cati* L.

PITHECELLOBIUM Mart., Hort. Monac. 188. 1829! nom. nud.

ZYGIA Browne, Hist. Jamaica 279. 1756! nom. rej.

SPIROLOBA Raf., Sylva Tellur. 119. 1838!

SIDEROCARPUS Small, Bull. N.Y. Bot Gard. 2: 91. 1901! non *Sidero-carpus* Pierre 1890.

HARVARDIA Small, Bull. N.Y. Bot. Gard. 2: 91. 1901!
EBENOPSIS Britt. & Rose, N. Am. Fl. 23: 33. 1928!

The name *Pithecellobium* has been subject to several spellings. I have taken up that first employed (Martius, 1829; loc. cit.) and reiterated in the Nomina Generica Conservanda (Lanjouw, 1966).

Total synonymy of *Pithecellobium sensu lato* is voluminous (Hutchinson, 1964; Woodson and Schery 1950; Kostermans, 1952). My enumeration includes only those represented in the United States.

Key to species

Leaflets 4

Rare cultivated or escaped shrub or tree of southernmost Texas and Florida; peduncels villosulous; perianth villosulous or puberulent . . . . . *P. dulce*

Native shrubs of southern Florida; peduncles and perianth glabrous to puberulent.

Leaflets 1.2–1.6(2.0) times as long as wide, scarcely reticulate; petioles usually longer than petiolules; racemes mostly exserted beyond leaves; plants usually spiny. *P. unguis-cati*

Leaflets (1.2)1.5–2.5(3) times as long as wide, coriaceous-reticulate; petioles usually shorter than petiolules; racemes largely included; plant unarmed . *P. keyense*

Leaflets more than 4; species of southern Texas

Leaflets 3–6 pairs; flowers in a spike; pod woody, essentially indehiscent . . . . . *P. flexicaule*

Leaflets 9–15 pairs; flowers capitate; pod thick-membranous, dehiscent . . . . . *P. pallens*

Pithecellobium dulce (Roxb.) Benth.

Southern Florida and southernmost (Cameron Co.) Texas, occasional in cultivation and as an escape. Native from Mexico to northern South America where widely cultivated. Introduced in Old World. March-April.

Chromosome number $2n = 26$ (Sampath and Ramanathan, 1949).

Pithecellobium dulce (Roxb.) Benth., Lond. J. Bot. 3: 199. 1844! *Mimosa DULCIS* Roxb., Pl. Corom. 1: 67. 1798! *Inga dulcis* (Roxb.) Willd. Sp. Pl. 4: 1005. 1806! *Feuilleea dulcis* (Roxb.) Ktze., Rev. Gen. 184. 1891!

Inga PUNGENS H. & B. ex Willd., Sp. Pl. 4: 1004. 1806! *fide* Benth. 1875. *Mimosa pungens* (Willd.) Poir., Lam. Encycl. Suppl. 1: 36. 1810!

Acacia OBLIQUIFOLIA Mart. & Gal., Bull. Acad. Brux. 10: 317. 1843! *fide* Benth.

Inga JAVANA DC., Prodr. 2: 436. 1825! Microfiche of fragment marked *Inga javana* in Herb. DC!

I. LEUCANTHA Presl, Bot. Bemerk. 65. 1844! *fide* Benth. 1875.

P. LITTORALE Britt. & Rose ex Record, Trop. Woods 11: 15. 1927! Type NY! *Record & Kuylen 107.*

Mimosa dulcis Roxburgh is fortunately identifiable by a fairly good plate.

Pithecellobium dulce, presumably native to the New World tropics, was introduced into the Old World at a relatively early date. Thus it entered nomenclature from far-flung localities. Roxburgh's *Mimosa dulcis* was from India; he notes that it was not native but introduced from the Philippines. The Humboldt and Bonpland *Inga pungens* was New World; Willdenow (loc. cit.) comparing it (almost with perplexity, one feels) with his *Inga dulcis* (Roxb.) Willd. notes "valde affinis praecedent." And *Inga javana* DC. was based on a gathering from Java previously characterized by Ventenat as *Mimosa affinis dulci.*

Pithecellobium flexicaule (Benth.) Coult.

Southern Texas. Mexico, south to Yucatan. Rarely Florida (cultivated). Roadside thickets, thorn scrub, with *Prosopis* and Cactaceae; bottomland woodland; sandy silt to clay loams; frequent in towns as cultivated ornamental. May-July. Texas Ebony.

Chromosome number $2n = 26$ (Atchison, 1951; as *Siderocarpus*)

Pithecellobium flexicaule is common in southern Texas as a small to medium-sized yard tree; it grows as brush in disturbed areas along roadsides. But, in a few remaining havens of relatively undisturbed woodland along the lower Rio Grande, ebony arises to the stature of massive trees with trunks exceeding one meter in diameter.

Pithecellobium flexicaule (Benth.) Coult., Contr. U.S. Natl. Herb. 2: 101. 1891! *Acacia FLEXICAULIS* Benth., Lond. J. Bot. 1: 505. 1842! *Zygia flexicaulis* (Benth.) Sudw. Bull. U.S. Dept. Agri. Div. For. 14: 248. 1897! *Siderocarpus flexicaulis* (Benth.) Small, Bull. N.Y. Bot. Gard. 2: 91. 1901! *Samanea flexicaulis* (Benth.) Macbride, Contr. Gray Herb. 59: 2. 1919!

Hoopsia ARBOREA Buckl., Proc. Phil. Acad. 1861: 453. 1862! Type PH! *Buckley,* Corpus Christi, Texas, May, 1860. (Exluding a second specimen on sheet, a caesalpinioid, probably *Parkinsonia aculeata*).

P. TEXENSE Coult. Contr. U.S. Natl. Herb. 1: 37. 1890! Type US! *Neally 133,* near Roma, Starr Co., Texas.

To date, I have not seen the type of *Acacia flexicaulis* Benth. Bentham's *A. flexicaulis* could scarcely be anything other than our species; yet it is puzzling that, after 33 years Benthan (1875), still retained it in the genus *Acacia.* The identity of Bentham's material, however, seems to have been taken for granted by all workers except Coulter (loc. cit.) who subsequently (1891) decided that his *P. texense* was the same as *P. flexicaule.*

Bentham (1875) states that *Acacia geniculata* Wendl. "appears to correspond precisely with *A. flexicaulis.*" *Acacia geniculata* Wendl. is not in Kew Index. There were two Wendlands, J. C. and H., both publishing in the early part of the 19th century. I have examined the published works of both authors in the libraries of the New York and Missouri Botanical Gardens. I have not encountered the binomial in question.

Bentham (1875) placed *Hoopsia arborea* Buckl. in synonymy under his *A. flexicaulis.* However, the description of *Hoopsia arborea* suggests the possibility of a mixture: a caesalpinioid species and *P. flexicaule;* this is verified by the specimen as indicated.

Pithecellobium keyense Britt. & Rose

Southern Florida. West Indies. In coral or sandy soils, usually adjacent to beaches; in open areas, or under pines or broad-leaved "scrub." (Oct.) Nov.-March.

Pithecellobium keyense and *unguis-cati* are briefly discussed on a comparative basis under the latter. *P. keyense* is closely related to *P. bahamense* Northrup of the Antilles. The unpublished combination, *P. bahamense* var. *keyense* Morton, appears on numerous specimens in the U.S. National Herbarium. Morton's disposition may be reasonable; but I have not studied West Indian material of the two taxa on a comparative basis, and I am not herein publishing the combination.

Pithecellobium KEYENSE Britt. ex Britt. & Rose., Fl. N. Amer. 23: 22. 1928! Type NY! *W. C. Coker 57,* Bahamas. *P. keyense* Britt. ex Coker, Veg. Bahamas Isl. 255. 1905! nom. nud.

As to concept:

Pithecellobium guadalupense (Pers.) Chap., Fl. So. U.S. 116. 1860! *Zygia guadalupensis* (Pers.) Heller, Cat. N.A. Pl. 105. 1905! neque *Mimosa GUADALUPENSIS* Pers. 1806. neque *Inga guadalupensis* (Pers.) Desv. 1814.

This species was known as *P. guadalupense* until Britton & Rose (loc. cit.), stating "not *Inga guadalupensis* Desv.", pubilshed the specific epithet *keyense.* The name *guadalupense* traces ultimately to Persoon whose description is too brief for identification. His material was "Hab ad Guadalupam (Herb. Juss.)."

A photograph (US!) of types of Delessert Herbarium includes one marked as "*Inga guadalupensis* Desv." The subject specimen is probably *P. unguis-cati;* it is neither *P. keyense* nor *P. guadalupense sensu* Chapman. But the critical material is that of Persoon which, if existent, is at L, and which I have not seen. In maintaining *P. keyense* Britt. & Rose, I necessarily make the assumption that Desvaux correctly took up Persoon's concept, or, at least, that the latter's specimen was not of *P. keyense.*

Pithecellobium pallens (Benth.) Standl.

Southern Texas and adjacent Mexico. Mesquite brushland on sandy to heavy clay; slightly in cultivation. April-August (Sept.)

Chromosome number $2n = 26$ (Turner and Fearing, 1960).

Pithecellobium pallens (Benth.) Standl., Tropical Woods 34: 39. 1933! *Calliandra PALLENS* Benth., Lond. J. Bot. 5: 102. 1846! Isotype or fragment of type GH! Photo of type (so designated) US! Coulter, Mexico. *Havardia pallens* (Benth.) Britt. & Rose, N. Am. Fl. 23: 42. 1928.

P. BREVIFOLIUM Benth. in Gray, Pl. Wright. 1: 67. 1852! *Feuilleea brevifolia* (Benth.) Ktze., Rev. Gen. 187. 1891! *Zygia brevifolia* (Benth.) Sudw., Bull. U.S. Dept. Agric. For. 14: 248. 1897! *Havardia brevifolia* (Benth.) Small, Bull. N.Y. Bot. Gard. 2: 92. 1901!

Acacia NEUCIANA Buckley, Proc. Acad. Phil. 1861. 453. 1862! Type PH! *Buckley*. On the Nueces river, Texas. May, 1860.

I have examined a photograph and presumed fragment of type material of *Calliandra pallens*. They look like *Pithecellobium pallens* (Benth.) Standl. But the specimen is fragmentary; my knowledge of the Mexican relatives of *C. pallens* is limited. Thus, I do not consider the determination unequivocal.

Pithecellobium unguis-cati (L.) Mart.

Southern Florida. West Indlies. Coral soil in wooded scrub, sand ridges, hammocks, roadsides. Oct.-Feb. April-Aug.

Pithecellobium unguis-cati and *keyense* are closely related and similar in appearance. They differ in several usually correlated characters (although there is no absolute delimitation on the basis of any single feature), and are usually distinguished without difficulty. A few specimens are troublesome; possibly this is an indication of limited introgression between the species. *P. unguis-cati* is usually prickly, has long petioles in proportion to the petiolules; the leaflets are of a thinner texture, usually smaller, and of broader proportions; the racemes are more elongate and exserted but the peduncles are usually the shorter of the two.

Although I have collected both species in the field several times, the original habitats (in the United States) are largely destroyed. I have the impression that *P. keyense* is usually of the beaches or contiguous thereto, whereas *P. unguis-cati* tends to be of more inland habitats. *P. keyense*, per specimens seen, is only a winter bloomer; *P. unguis-cati* flowers in the winter but also April-August.

Pithecellobium unguis-cati (L.) Mart., Hort. Monac. 188. 1829! *Mimosa UNGUIS-CATI* L., Sp. Pl. 517. 1753! *Spiroloba unguis* Raf., Sylva Tell. 119. 1838! *Feuilleea unguis-cati* (L.) Ktze., Rev. Gen. 184. 1891! *Zygia unguis-cati* (L.) Sudw., Bull. U.S. Dept. Agric. For. 14: 248. 1897!

Mimosa GUADALUPENSIS Pers., Syn. 2: 262. 1806! *Inga guadalupense* (Pers.) Desv., Jour. Bot. 3: 70. 1814! Photo of Desvaux "type" (Delessert Herb.) US!

P. FLAVOVIRENS Britt, Bull. N.Y. Bot. Gard. 3: 442. 1905!

Linnaeus' citations apparently support the classic interpretation of his *M. unguis-cati*. The specimen in the Linnaean herbarium (microfiche!) is evidently of this species, but probably was not in Linnaeus' possession in 1753. My knowledge of the *P. unguis-cati*-group is not, at the present time, sufficient to render typification critical.

The identity of *Mimosa guadalupensis* Pers. is discussed under *M. keyense*.

Further synonymy is given by Bentham (1875).

Rejected species

Pithecellobium saman (Jacq.) Benth. The "rain tree," native from Central America to Brazil, is widely planted in the tropics of both hemispheres. It is probably present to a slight extent in southernmost, urban Florida, and is treated by Bailey (1949). However, I have not observed it in the Miami area, Homestead, or Key West, neither have I seen U.S. specimens in herbaria.

Pithecellobium calostacys Standl. and *lanceolatum* (H. & B.) Benth. I have seen collections of cultivated material from extreme southern Texas that I tentatively assign to these species. I have not observed any of Pittier's (1922) "spicate-flowered species . . . of the *unguis-cati* section" in the field, nor seen previous reports of their occurrence in the United States.

Prosopis L.

Shrubs or small trees usually armed with nodal spines (stipules or determinate branches). Leaves bipinnate; pinnae 1–2 pairs, an obscure gland between the lower pair. Leaflets several or numerous. Inflorescences spicate (and ament-like) or (one local species) capitate, yellowish. Calyx synsepalous, scarcely lobed. Corolla of nearly separate petals, but loosely connate above middle until early anthesis. Stamens 10; young anthers terminally bearing a quickly deciduous, stalked, capitate gland. Legume elongate, woody, several-seeded, indehiscent, irregularly moniliform, or coiled spring-like.

Ca. 35 species of warm regions, primarily of New World, but a few kinds widely introduced in Eastern Hemisphere. Ours of the Southwest, Texas to California, *P. glandulosa* extending northward to extreme southern Kansas.

Chromsomse base number x = 14(13?); determinations on about 15 species.

Bentham (1842, 1846, 1875) treated *Prosopis* as a polymorphic genus with several sections and took active issue with Engelmann and Gray (1845) and Gray (1852) who believed the U.S. species to include two

genera, *Algarobia* and *Strombocarpa*. Less than unanimous viewpoints have continued. Britton & Rose (1928) divided North American *Prosopis* into three genera, and this position has recently been reiterated by Hutchinson (1964). On the other hand, Burkart (1940) has taken up (and expanded) the Bentham delimitation, and this posture is assumed by most U.S. authors. (More recently, however, Burkart, 1964, has segregated two species, South America to Mexico, as *Prosopidastrum*). It is true that the screwbeans (e.g., *P. pubescens*), possessing uniquely coiled pods and stipular spines, seem very different from mesquite (e.g., *P. glandulosa*) with more conventional indehiscent pods, and spines which are possibly determinate branches. But intermediates mar the picture; and I have taken up the Bentham and Burkart delimitations.

Cherubini (1954), making chromosome number determinations for 15 taxa of *Prosopis,* reported a consistent $2n = 56$, except for a few instances of "56 ± 112." The latter figures presumably mean that he found plates of both 56 and approximately 112. These findings reflect somatic polyploidy which has been reported several times in the Mimosoideae. I have discussed this phenomenon elsewhere (Isely, 1970). Chromosome counts have been made on various forms of *P. juliflora sensu lato* by about eight workers. The results include multiples of both bases 13 and 14, interpretation of which are uncertain (see *P. glandulosa* of this treatment). In any event, *Prosopis* appears to be largely a derived aneuploid group as contrasted to the generalized $x = 13$ for the Mimosoideae.

Burkart (1940) has summarized much of *Prosopis* but his attention to North American forms is limited. He apparently regarded the major U.S. species *(P. glandulosa* and *P. velutina)* as relatives of the South American *P. chilensis* (Mol.) Stuntz, but they are neither treated nor cited as synonyms.

Standley (1922) regarded *Prosopis* of Mexico as four species. Britton and Rose submitted the same taxa to their conventionally rigid, but descriptively useful treatment as three genera including 17 species. The mesquites (*P. juliflora* and relatives) have been more recently studied by Benson (1941) for the U.S. only, and by Johnson (1962) for all of North America.

PROSOPIS L., Mant. Pl. 1: 10. 1767! Type species: *P. spicigera* L. = *P. cineraria* (L.) Druce

NELTUMA Raf., Sylva Tell. 119. 1838!

ALGAROBIA (DC.) Benth., Pl. Hartw. 13. 1839!

STROMBOCARPA Eng. & Gray, Bost. Jour. Nat. Hist. 5: 243. 1845!

SOPROPIS Britt. & Rose, N. Am. Fl. 23: 182. 1928!

The type of *Prosopis* is one of two Asiatic species that constitute the section *Adenopsis* DC. (Burkart, 1940). I am not familiar with these species. Employment of the name *Prosopis* is based on the Bentham (1875) circumscription that associates these Old World kinds with this largely American group.

The name *Strombocarpa* originated as a sectional name of Bentham's (1842). As a genus, it is sometimes cited "(Benth.) Engelm. & Gray." Engelmann and Gray, however, provided no citation, direct or indirect. And if there come those who may desire to revive this name at the generic level, I suggest that they review the original "diagnosis," with respect to valid publication.

Key to species

Flowers in globose heads; leaflets less than 4 mm long; low shrubs at most a few dm high; southern Texas only . . *P. cinarescens*

Flowers in spikes; leaflets (4)5–30 mm in length; shrubs or trees, 1–10 m.

Leaflets 5–8 pairs per pinna, mostly less than 10 mm long; pods coiled up spring-like; western Texas to southern California. *P. pubescens*

Leaflets 10–18(30) pairs per pinna, often exceeding 10 mm in length; pod not coiled.

Local, Nueces Co., Texas; leaflets 4–6(9) mm long. *P. laevigata*

Widely distributed species; leaflets of forms sympatric with *P. laevigata,* 25–35 mm long.

Leaflets glabrous, 5–12 times as long as broad, mostly 1–4 cm long, spaced so that intervals between leaflets are as great or greater than width of leaflets; pinnae 1 pair; Texas to California but largely absent in southern Arizona deserts (occasional pubescent forms in western Texas; some intermediacy with following species in Arizona). *P. glandulosa*

Leaflets pubescent, 3–7 times as long as broad, mostly 0.6–1.3 cm long, usually crowded so that intervals are less than width of leaflets; pinnae 1–2(3) pairs; southern Arizona . . . . *P. velutina*

Prosopis cinerascens (Gray) Benth.

Southern Texas and adjacent Mexico. Sandy bluffs, ocean beaches and adjacent dunes, grassland. March-April (June).

Workers have not been in agreement on the specific distinctiveness of *Prosopis cinerascens* and *P. reptans* of Argentina. Turner (1959) without discussion follows Burkart in treating Texas material as *Prosopis reptans* var. *cinerascens* (Gray) Burkart. Burkart (1940), in reducing *P. cinerascens,* cites only three North American specimens; I defer judgment until more material has been studied on a comparative basis.

Cherubini (1954) reports a $2n$ chromosome number of "56 ± 112" for *Prosopis reptans.*

There is ample evidence throughout the Mimosoideae of the plasticity of inflorescence form and of the limited taxonomic significance that can be attributed to it. This is strikingly documented by *P. cinerascens* and *pubescens* both of which have the unique *Strombocarpa* type pod. But the inflorescence of *P. pubescens* is an amentiferous spike similar to that of *P. glandulosa-velutina,* while that of *P. cinerascens* is a globose head.

Prosopis cinerascens (Gray) Gray ex Benth., Trans. Linn. Soc. 30: 381. 1875! *Strombocarpa CINERASCENS* Gray, Pl. Wright. 1: 61. 1852! *Prosopis reptans* var. *cinerascens* (Gray) Burkart, Darwiniana 4: 75. 1940!

Mimosa CALCAREA Buckl., Proc. Acad. Sci. Phil. 1861: 453. 1862! Type PH! *Buckley*. Near Live Oak, Texas. 1860.

Gray (loc. cit.) cited, "Valley near Azufrora, New Leon, Dr. Gregg." In GH, a sheet marked "type" contains three specimens of *Prosopis cinerascens;* they are marked as Schott, Wright, and "Mexican Boundary Survey" gatherings. I have seen no Gregg material.

Prosopis glandulosa Torr.

Western Louisiana to southern California, north to southern Kansas, occasionally introduced elsewhere. Mexico. Valleys and dry uplands, abundant and extensively dominant. April-June. Mesquite.

Chromosome number $n = 14$ (e.g., Baquar et al., 1966), $2n = 56$ (e.g., Atchison, 1951), $n = 13$ (e.g., Bir and Sidhu, 1966), $2n =$ "56 ± 112" (Cherubini, 1954), $2n = 26$ (Ramanathan, 1950), $2n = 52$ (Sampath and Ramanathan, 1949). (Tabulation includes chromosome counts attributed to *Prosopis juliflora, P. juliflora* var. *glandulosa,* and *P. glandulosa;* see discussion in following paragraphs).

The mesquites range through the southwestern United States, Mexico, and portions of coastal Central America and South America, particularly Argentina and Chile. They are introduced into other parts of the world. They include several related taxa resistant to a satisfactory classification.

Botanists have alternated between treating United States mesquites as one polymorphic species, or segregating several of the variants as specific entities. *P. glandulosa* and *P. velutina* were recognized by Britton and Rose (1928). Benson (1941) believed these taxa conspecific with the *P. juliflora* (Sw.) DC. which in its typical form is a coastal inhabitant of Mexico and West Indies. Standley (1926) felt that *P. juliflora* represents the North American phases of the South American *P. chilensis* (Mol.) Stuntz. Johnston (1962), treating the biosystematics of *Prosopis*: *Algarobia* of Mexico and the southern United States has reversed this trend, recognizing six species of North American mesquites.

I have approximately followed Johnston. Under this interpretation, the traditional *P. juliflora* does not occur in the United States. It is a tropical, coastal plant with glabrous, comparatively broad leaflets. *P.*

glandulosa, then, is the principal mesquite in the United States—its range is interrupted only by a zone of *P. velutina* in Arizona and local *P. laevigata* in Nueces Co., Texas.

One might substantiate a viewpoint that these taxa constitute major subspecific units of a broadly defined *P. juliflora.* In particular, I have difficulty regarding *P. velutina* as more than a desert form of *P. glandulosa.* But Johnston's (1962) historical portrait is reasonably convincing and I have accepted his position. I have not studied the relationship of the South American *P. chilensis* and its relatives to our *P. glandulosa.* Both Benson (1941) and Johnston (1962) reject the thesis that the South and North American plants are conspecific.

The chromosomes of mesquite have been counted many times but a haze of uncertainty remains. Determinations that probably largely represent *P. glandulosa* of present delimitation have been reported as *Prosopis juliflora* or *P. glandulosa.* The *P. juliflora* complex apparently includes polyploid series (independent of somatic polyploidy?) on base numbers of both 13 and 14. Determinations identified with *P. glandulosa* also include both number series. However, a preponderance of these chromosome reports represent work done in the Old World on introduced material; uncertainty of critical identification exists. This cytological situation ostensibly supports Johnston's (1962) viewpoint that the classical *P. juliflora* includes several species; but, contrary to his position, suggests a basis of cross-incompatibility. A critical correlation of taxonomic hypotheses and the genome analyses remains to be accomplished.

Cherubini's (1954) report of only the base number 14 ($2n = 56$ or "56 ± 112") for ca. 15 taxa of *Prosopis* invokes other speculation. Inasmuch as 14 is a derived number in the Mimosoideae, does the *Prosopis juliflora* complex, carrying remnants of a basic 13, occupy a progenitor position to most of the genus? Or, alternatively, are base 13 determinations errors occasioned by interpretational difficulties compounded with the expectation of a base 13 in the Mimosoideae?

In the United States, mesquite is usually regarded as a weed and strenuous efforts have been made to find economical methods of eliminating it from range land. Contrariwise, Standley (1922) enumerates its many virtues; and in Hawaii where a South American mesquite (*P. pallida fide* Johnston, 1962) has been introduced, it is considered a valuable introduced tree. Bogusch (1950) has compiled a bibliography and literature review.

I follow Benson (1941) and Johnston (1962) in distinguishing an eastern and western segment of *P. glandulosa.* The two subordinate taxa are characterized by reasonable correlation of geographic and morphological features. There are indeed a few gross exceptions in the geographic consistency of the two types. The most blatant of these, e.g., var. *torreyana* in Missouri, var. *glandulosa* in California are certainly introductions.

Johnston's and Benson's criteria for distinguishing the two varieties

differ in emphasis; mine bears greater similarity to Johnston's.

Key to varieties

Leaflets mostly 2.5–3.5 cm long, the well-developed narrow ones 8–12 times as long as broad; leaflets 6–12(15) pairs per pinna, mostly 8–10 pairs; thorns usually solitary; primarily Texas and Oklahoma west to the Pecos River, occasional in trans-Pecos Texas but less common than var. *torreyana,* exceptionally west of Texas . . . . . var. *glandulosa*

Leaflets mostly 1–2(2.5) cm long, mostly 5–8 times as long as broad; leaflets 9–15(20) pairs, mostly 10–12 pairs; thorns frequently paired; trans-Pecos Texas and west except for local eastern stations . . . . . var. *torreyana*

Var. *glandulosa*

Distribution as key above. Slopes, plains, alluvial soil along streams, desert scrub. Abundant, often dominant and forming "woodlands" over thousands of acres. April-May (June).

Var. *glandulosa* is, in Texas, one of the more characteristic woody species of open rangeland. Presumably it has invaded much grassland the last hundred and fifty years as a consequence of overgrazing of the perennial grass cover.

Except for a few pockets of var. *torreyana* and the single introduction of *P. laevigata,* var. *glandulosa* is the only mesquite east of the Pecos River. It is sporadically present in trans-Pecos Texas, and, there, usually distinct from var. *torreyana.* However, the mesquites of the Mesilla Valley in southern New Mexico are ambiguous; as to characters they seem to overlap vars. *glandulosa* and *torreyana.* I have treated them as *glandulosa.* I have seen a few collections of var. *glandulosa* from Arizona and California; I presume they represent introductions.

Prosopis GLANDULOSA Torr., Ann. Lyc. N.Y. 2: 192. 1827! Type NY! (See discussion) *Algarobia glandulosa* (Torr.) T. & G., Fl. N. Am. 1: 399. 1840! *P. juliflora* var. *glandulosa* (Torr.) Cockerell, Bull. New Mex. Agric. Expt. Sta. 15: 58. 1895! *P. chilensis* var. *glandulosa* (Torr.) Standl., Contr. U.S. Natl. Herb. 23: 1658. 1926! *Neltuma glandulosa* (Torr.) Britt. & Rose, N. Am. Fl. 23: 186. 1928!

P. juliflora CONSTRICTA Sargent, Tree & Shrubs 2: 249. 1913! *Neltuma constricta* (Sargent) Britt. & Rose, N. Am. Fl. 23: 186. 1928!

Neltuma NEOMEXICANA Britt. in Britt. & Rose N. Am. Fl. 186. 1928! Type US! *Mearns 2325.*

Torrey designates the type of *Prosopis glandulosa* as James: "On the Canadian?" The collection that I have taken as the type (NY) is unidentified except for the Torrey Herbarium stamp. Attached to it is a manuscript description in Torrey's handwriting which is a rough draft of the published description. Benson (1941) noted that this specimen may

be the type; I take it as the holotype. I have no idea when or by whom this manuscript fragment was attached to the specimen. If this uncertainty is given weight, the specimen could, I suppose, be designated as a lectotype. Probabilities suggest that it can reasonably be called the holotype.

P. juliflora constricta Sargent is *P. glandulosa* with strongly and evenly constricted pods. The type of *Neltuma neomexicana* has been examined by Benson (1941).

Var. *torreyana* (Benson) Johnston

Trans-Pecos Texas to California, sporadically further east; largely absent from Arizona except northern portion. River bottoms and canyon floors, washes, rocky slopes and ridges, desert flats with greasewood, sand dunes; disturbed areas, e.g., along roadsides and irrigation ditches. 200–6500 ft. March-June.

Var. *torreyana* includes a considerably greater range of morphological variance than var. *glandulosa* or *P. velutina.* This variance is matched by the greater number of habitats occupied and the probable number of biotypes included.

The replacement of *Prosopis glandulosa* var. *torreyana* by *P. velutina* in the Sonoran desert is discussed by Johnston (1962). I can discern no morphological differentiation between the eastern and western phases of var. *torreyana* except a limited reverse cline towards the var. *glandulosa* leaf form in California and sporadically in Arizona (mixing following introduction of var. *glandulosa*?).

I have designated only a few sheets east of Brewster Co., Texas, as var. *torreyana*: e.g., one specimen, Bexar Co., Texas, two specimens coastal Texas (Nueces and Kleberg Co's.), and Sheffield, Missouri, "introduced along railroad yards and waste places" (letter, Bush to Small, 1927). I now regard the identity of the Nueces Co. material as suspect. See *P. laevigata.*

Material of var. *torreyana* from the Big Bend area, Texas, tends to possess a high number of leaflets and is sometimes pubescent. Relevant hypotheses are presented by Johnston (1962).

Putative intermediates between *Prosopis glandulosa* var. *torreyana* and *P. velutina* are discussed under the latter species. A few specimens of West Texas and New Mexico fall between vars. *torreyana* and *glandulosa;* I refer to them under var. *glandulosa.*

Prosopis glandulosa var. *torreyana* (Benson) Johnst., Britt. 14: 82. 1962! *P. juliflora* var. *TORREYANA* Benson, Amer. J. Bot. 28: 751. 1941! Isotypes NY! US! *Benson 11000,* Needles, California.

P. ODORATA Torr. & Frem., Report 313. pl. 1. 1845! Type NY! Specimen marked by Torrey as *"Prosopis (Strombocarpa) odorata* Torr. in Frem., Rept." excluding fruits.

The typification of *Prosopis odorata* Torr. & Frem. is discussed under *P. pubescens*.

Prosopis laevigata (Willd.) M. C. Johnst.

Local, Nueces County, Texas. Of wide distribution in Mexico.

Chromosome number $2n = 28$. (Fearing voucher specimen (TEX) annotated by M. C. Johnston as *Prosopis laevigata*).

Prosopis laevigata is reported in the United States by Johnston (1962). He refers to several individuals of *P. laevigata* "growing with *P. glandulosa* and with numerous apparent back-cross types in a small, badly disturbed pasture along Nueces Bay."

Recent correspondence with Dr. Marshall Johnston has elicited the following helpful commentary regarding *Prosopis laevigata* (quoted with permission):

"Calvin McMillan has examined the *P. laevigata* population of Nueces Co. more thoroughly than anyone else. There is probably only one individual of 'pure' *P. laevigata* in Nueces Co., and it seemingly represents a chance introduction. It apparently does not self-pollinate, for progeny tests from its seeds yield a variety of 'hybrid' types. It is surrounded by what Calvin agrees is an authentic hybrid swarm with various back-cross types, presumably involving *laevigata* and the disgustingly abundant *P. glandulosa* of that region. Perhaps the most interesting fact here is the apparently obligate out-crossing."

It may be that material from Nueces Co., that I have associated with out-of-range *P. glandulosa* var. *torreyana* represents some of these back-crosses.

Prosopis laevigata belongs to *P. juliflora* complex and is closely allied with *P. glandulosa* and *P. velutina*. Among numerous Mexican sheets examined, I have seen only two which seemed intermediate with *P. juliflora*. The distinction from *P. velutina* seems more tenuous.

Prosopis laevigata (Humb. & Bonpl. ex. Willd.) Johnston, Britt. 14: 78. 1962!
Acacia LAEVIGATA Humb. & Bonpl. ex. Willd., Sp. Pl. 4: 1059. 1806!

Synonymy is provided by Johnston (1962). Johnston (correspondence) states, "I looked at the type in the Willdenow herbarium. It checks but is a mere fragment—hard to interpret."

Prosopis pubescens Benth.

Western Texas to southern California, north to southern Utah. Usually creek and river bottoms, flood plains, washes, along irrigation ditches, but also open desert. Locally common. —100–4000 ft. April-May (Sept.) Screw-bean.

Chromosome number $2n = 56$ (Cherubini, 1954).

Prosopis PUBESCENS Benth. Lond. J. Bot. 5: 82. 1846! *Strombocarpa pubescens* (Benth.) Gray, Pl. Wright. 1: 60. 1852!

P. EMORYI Torr., Bot. Emory Report. 139. 1848! Presumed type NY! Unmarked Emory specimen (faded label).

Strombocarpa brevifolia Nutt. ex Gray, Pl. Wright. 1: 60. 1852! As synonym; *S. pubescens* fide Gray.

As to concept:

P. ODORATA Torr. & Frem., Frem. Report 313 pl. 1. 1845! As to fruits; non typification Benson (1959). Type NY! Specimen marked by Torrey as "*Prosopis (Strombocarpa) odorata* Torr. in Frem., Rept." *Strombocarpa odorata* Gray, Bot. U. S. Expl. Exped. (Wilkes) 1: 475. 1854. nom nud. *S. odorata* (Gray) Britt & Rose, Fl. N. Am. 23: 183. 1928! as (Torr.) Gray.

Prior to Benson's (1941) study of *Prosopis,* this species was usually designated *P. odorata* Torr. By both description and plate, the Torrey and Fremont *P. odorata* is obviously *P. glandulosa* var. *torreyana* as to foliage and flowers, and *P. odorata* as to fruit. No specimens were cited but there are three sheets at NY which are mixtures of these two species and ostensibly the Fremont material with which Torrey worked. Benson (1959) has designated these three sheets "the fruit excluded . . . as a lectotype of *Prosopis odorata* Torr. & Frem." I have subsequently marked one of these sheets as the lectotype, the others as isotypes. *P. odorata* then becomes a synonym of *P. glandulosa* var. *torreyana.*

Prosopis pubescens Benth. was published one year after *P. odorata;* the description provides clear identification.

Prosopis velutina Wooton

Southern Arizona and sporadically in California (introduced?), Mexico. Sandy soil in washes, river bottoms or dry flats, canyons; creosote bush-cactus desert, dunes; locally common; slightly in cultivation. 500–5500 ft. (April) May-July (Oct.). Mesquite.

Chromosome number $2n = 56$ (Cherubini, 1954; as *P. juliflora* var. *velutina*).

The peripatetic classification of the mesquites is briefly reviewed under *P. glandulosa.* I have followed Johnston (1962) in treating *P. velutina* as a species. *P. velutina* interrupts the distribution of *P. glandulosa* in Southern Arizona—the latter species lies to both the east and the west. *P. glandulosa* is, however, irregularly continuous across the higher elevations of northern Arizona. The possible historical basis of this partial disjunction of *P. glandulosa* and replacement by *P. velutina* is discussed by Johnston (1962).

Johnston refers to presumably recent mixing between *P. glandulosa* var. *torreyana* and *P. velutina.* Benson (1941) notes that there are intergrades "in many localities" in Arizona. I have encountered perhaps two

dozen problematic specimens in various degrees phenotypically intermediate between *P. velutina* and *P. glandulosa* var. *torreyana*. Perhaps the greatest number are from Yuma Co., southwestern Arizona, where *P. velutina* grades into the California phase of *P. glandulosa* var. *torreyana*; others are from north-central Arizona (towards the Grand Canyon form of *torreyana*) and eastern Arizona. I have defined (and designated) intermediates approximately as follows:

Prosposis velutina towards *torreyana*: (1) *velutina* leaflet spacing and size but reduced pubescence. (2) *velutina* leaflet size and moderate pubescence, but *torreyana* spacing.

Prosopis glandulosa var. *torreyana* towards *velutina* : *torreyana* leaflet-spacing and size but mildly pubescent.

Turner (1959) has referred several collections from western Texas to *P. juliflora* var. *velutina,* and Benson (1941) reports *velutina* from Texas along the Rio Grande. Johnston (1962) agrees that some of the mesquites "in the area from the Big Bend of Texas southwest to central Chihuahua have smaller, closer, and more numerous leaflets than usual [in *P. glandulosa*]." I concur, and note that the leaflets of some Big Bend forms of these are pubescent. Johnston attributes this situation, at least in part, to introgression of *P. glandulosa* from *P. laevigata*; and I consider this the most reasonable hypothesis. In any event, I cannot presently associate any Texas material that I have seen with *P. velutina*.

Prosopis VELUTINA Wooton, Bull. Torr. Club 25: 456. 1898! Type NY! *Pringle,* Arizona Apr. 23, 1881. *P. juliflora* var. *velutina* (Woot.) Sarg., Silva 13: 15. 1902! *P. chilensis* var. *velutina* (Wooton) Standl., Contr. U.S. Natl. Herb. 23: 1658. 1926! *Neltuma velutina* (Wooton) Britt. & Rose, N. Am. Fl. 23: 186. 1928!

Wooton (loc. cit.) cites several collections; I have seen some of them. From among these, Britton & Rose (1928) designate the above cited Pringle collection as the lectotype.

Rejected Species

Prosopis strombulifera (Lam.) Benth. is reported from California by Munz (1959) as follows: "Native of Argentina and grown at Experiment Station at Bard, Imperial Co., from which it is reported as escaped." I have seen no confirming specimens in the herbarium of the Rancho Santa Ana Botanic Garden.

There are two specimens in the University of Arizona herbarium marked *P. chilensis* (Mol.) Stuntz, one "cultivated from South America, Yuma City Park," the other "University farm, Tucson." These specimens do not seem to represent native kinds, but I do not believe they are *P. chilensis;* the leaflets are too small and closely crowded. The specimens better meet the criteria for *P. alba*.

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Note added in proof; see page 280: It is *Calliandra haematocephala* Hassk. Nevling and Elias (1971. *Calliandra haematocephala:* history, morphology, and taxonomy. Jour. Arn Arb. 52:69–85.) cite specimens from Florida as well as California (plus several botanic garden and greenhouse gatherings elsewhere).—Author.

NOTES AND NEWS

Pinus Ponderosa in Malheur County, Oregon.—A relict stand of *Pinus ponderosa* Laws. was found on the end of a ridge extending north from Mahogany Mountain toward Leslie Gulch, Malheur County, Oregon, lat. 43° 17′ N, long. 117° 14′W. *(Packard 69–1, 69–2, 69–3,* College of Idaho). The stand consists of four old trees on the edge of one ridge with sixteen younger trees of all age classes including apparent seedlings growing among and below them. One young tree could be seen on the ridge to the east but the terrain discouraged close observation. The ridge where the Ponderosa pine was growing was at an elevation of about 5,000 ft. Only the bare, eroded end of the ridge where the rhyolitic tuff had been exposed was occupied by the pine. Lower slopes and unexposed portions of the ridge were covered sparsely by *Juniperus occidentalis* Hook. which also intermingled with the pine to some extent. The four old trees had an abundant cone crop. The largest was 93 inches dbh. Growth rings in a branch six feet above the root level were too small to count accurately but the branch contained over 90 xylem layers, discounting the possibility of introduction of the trees by early settlers. Estimated age of the four old trees was 300 years or more. Erosion had exposed 30 inches of the root system. The nearest stand of *Pinus ponderosa* is on the Boise Front, 65 air miles northeast but the relict stand differs from these trees, the relict population having needles 10 to 20 cm long on old trees and small cones under 10 cm long with recurved prickles. The next closest Ponderosa pine in the vicinity is a small stand on rhyolitic sand in the Sheldon National Antelope Refuge, roughly 100 air miles southwest (Critchfield and Allenbaugh, 1969), Madroño 20:12–26) just south of the Oregon-Nevada border.—Patricia L. Packard, Department of Biology, College of Idaho, Caldwell, 83605.